

What we claim is:

1. A method for molding an upper and a lower mold having no flask and that match each other, comprising:

(1) a putting and holding process to put a match plate in between an upper and a lower flask having intakes for foundry sand and being horizontal and to hold the match plate,

(2) a defining process to define an upper and a lower molding space by inserting an upper and a lower squeeze means into openings of a pair of the upper and the lower flask having no match plate,

(3) a rotating and moving process to rotate the pair of the upper and the lower flask and the match plate so that they are perpendicularly positioned, and to move them so that the intakes of the upper and the lower flask move upward,

(4) a filling process to fill the upper and the lower molding space with the foundry sand through the intakes of the upper and the lower flask,

(5) a squeezing process to squeeze the foundry sand of the upper and the lower molding space by causing the upper and the lower squeeze means to further approach each other,

(6) a rotating process to rotate the pair of the upper and the lower flask and the match plate so that they are horizontally positioned, and

(7) a removing process to remove the match plate disposed between the upper and the lower flask after separating the upper and the lower flask containing a mold from the match plate,

(8) a matching process to match the upper and the lower flask containing the mold, after the core is installed between the upper and the lower mold, if necessary, and

(9) a removing process to remove the molds from a pair of the upper and the lower flask that are caused to match each other.

2. A method of claim 1, wherein,

(2) the defining process to define the upper and the lower molding space by inserting the upper and the lower squeeze means in openings of the pair of the upper and the lower flask having no match plate, and

(3) the rotating and moving process to rotate the pair of the upper and the lower flask and the match plate so that they are perpendicularly

positioned, and to move them so that the intakes of the upper and the lower flask move upward,

are simultaneously carried out.

3. A method of claim 1,

wherein the squeezing process to squeeze the foundry sand of the upper and the lower molding space by causing the upper and the lower squeeze means to further approach each other, and the rotating process to rotate the pair of the upper and the lower flask and the match plate so that they are horizontally positioned, are simultaneously carried out.

4. A method of claim 1,

wherein an upper and a lower squeeze plate are provided as the upper and the lower squeeze means.

5. A method of claim 1,

wherein upper and lower segmented squeeze feet are provided as the upper and the lower squeeze means.

6. A method of claim 4, wherein after the filling process to fill the upper and the lower molding space with the foundry sand through the intakes of the upper and the lower flask is completed, it further comprises:

a) a process to move further apart the upper squeeze plate from the lower squeeze plate to a predetermined distance, and

b) a filling process to fill the upper and the lower molding space with the additional foundry sand through the intakes of the upper and the lower flask.

7. A method of claim 6, wherein,

a) the process to move further apart the upper squeeze plate from the lower squeeze plate to a predetermined distance, and

b) the filling process to fill the upper and the lower molding space with additional foundry sand through the intakes of the upper and the lower flask, are simultaneously carried out.

8. A method of claim 5,

wherein (2) the defining process to define an upper and a lower molding space by inserting the upper and the lower squeeze means into openings of a pair of the upper and the lower flask having no match plate further includes a setting process to set the distance between the pattern of the match plate and each of a plurality of the upper and lower segmented-squeeze feet so that each ratio of the distance after squeezing and that before squeezing becomes the same.

9. A method of claim 5,

wherein (2) the defining process to define the upper and the lower molding space by inserting the upper and the lower squeeze means into openings of a pair of the upper and the lower flask having no match plate further includes a forming process to form the molding space defined by the pattern of the match plate and each of a plurality of the upper and lower segmented-squeeze feet so that the foundry sand can easily flow in the molding space.

10. A method of claim 9,

wherein the forming process to form the molding space defined by the pattern of the match plate and each of a plurality of the upper and lower segmented-squeeze feet so that the foundry sand can easily flow in the molding space further includes a reducing process to reduce the friction between the foundry sand and a wall of an aeration tank by jetting air into a nozzle of the aeration tank and a portion where it is difficult for the foundry sand to flow.

11. A method of claim 5,

wherein (4) the filling process to fill the upper and the lower molding space with the foundry sand through the intakes of the upper and the lower flask and (5) the squeezing process to squeeze the foundry sand of the upper and the lower molding space by causing the upper and the lower squeeze means to further approach each other further include

a) a first filling process to fill the upper and the lower molding space defined by the upper and the lower flask, the upper and the lower squeeze means, and the match plate, which are perpendicular, with the foundry sand through the intakes of the upper and the lower flask,

b) a first squeezing process to squeeze the foundry sand of the upper and the lower molding space by causing a plurality of the upper and lower segmented-squeeze feet of the upper and the lower squeeze means to further approach each other,

c) a second filling process to fill the upper and the lower molding space with the additional foundry sand through the intakes of the upper and the lower flask after the retracting process is completed to retract the upper and lower segmented-squeeze feet, and

d) a second squeezing process to squeeze the foundry sand of the upper and the lower molding space by simultaneously causing the upper and lower segmented-squeeze feet, whose surfaces are arranged in a plane, to further approach each other.

12. An apparatus for molding an upper and a lower mold that match each other and that has no flask, comprising:

(1) a unit of an upper and a lower flask each having intakes disposed at their side walls for foundry sand, which flasks are connected to each other by connecting rods so that they can move close to and away from each other,

(2) a match plate disposed between the upper and the lower flask so that the match plate can be inserted in and taken out by a conveying apparatus,

(3) a squeezing mechanism to squeeze the foundry sand, which mechanism supports the unit of the upper and the lower flask having the match plate between them by a plurality of clamping mechanisms so that the unit of the upper and lower flask can be removed, which mechanism supports an upper and a lower squeeze means inserted into openings of the upper and the lower flask having no match plate so that the squeeze means can be taken out, and which mechanism can clockwise or counterclockwise rotate in a perpendicular plane about a supporting shaft so that the pair of the upper and the lower flask having the match plate between them can become perpendicular and horizontal,

(4) a driving mechanism to clockwise or counterclockwise rotate the squeezing mechanism,

(5) an aeration mechanism to fill the foundry sand into the upper and the lower flask, which are both perpendicular, by means of the driving mechanism, through the intake.

13. An apparatus of claim 12,
wherein the upper and the lower squeeze plate are provided as the upper and the lower squeeze means.
14. An apparatus of claim 12,
wherein upper and lower segmented squeeze feet are provided as the upper and the lower squeeze means.
15. An apparatus of any of claims 12, 13 and 14,
wherein the clamping mechanisms to clamp the connecting rods for holding the unit of the upper and the lower flask comprise the following:
a pair of swinging motors, and
clamp means fixed to the swinging shafts of the swinging motors.